tion solves its own problems. The new men of the new schools of science will master the problems of abundance and of distraction even as ours solved the problem of hostility and of neglect. The man is superior to the environment, and the man of science will do the work he loves for the love of it. In this love he will develop the abundance of life in others as in himself, and this is the highest end of all our striving.

The atmosphere of a great teacher raises lesser men to his standard. It perpetuates the breed. It was not books nor apparatus that made Döllinger or Agassiz or Brooks successively centers, each of a school of research. It was the contagion of devotion, the joy of getting at the heart of things, the love of nature, the love of truth. Sometimes, in our wealth of educational opportunity, we long for the time when, as of old, the student had the master all to himself, the master unperplexed by duties of administration not called hither and thither by the duties of his station, but giving himself, his enthusiasm, his zeal and his individuality, to the student, not teaching books, but how to make books our servants, all this time master and student struggling together to make both ends meet and sometimes succeeding, "so happy and so poor." So it was in the old time, and so it shall be again when the new demands and the new wealth find their adjustment. And to find this we shall not go back to Grigsby's Station, nor yet to Penikese; for the scholars that are to be shall rebuild the American universities in their own way, as the scholars of to-day are restoring the University of Cambridge, and in a greater or less degree all other universities in all other lands where men know and love the truth.

David Starr Jordan

AN EXPERIMENT IN MEDICAL PEDAGOGY[1]

You may be surprised to know that I am very thoroughly aware of a certain measure of unpopularity I possess as a teacher of pathology. The condition long ago acquired definite features of chronicity. I know too that a certain apprehension in some instances has been the chief impelling force for the thorough work students have done with me. It may also surprise you to learn that the realization of these conditions has never been especially pleasing.

In view of my considerable tenure of office in this institution, now eighteen years, it would seem as though some explanation for this state of affairs was about due and I have been impressed with the notion that an attempt to make one might at least entertain you for the period usually allotted to this part of the program. I prefer that you decide whether the explanation I am about to undertake of this unpopularity is an apology or a defense.

There is no doubt that some of this opprobrium which in common with most teachers has been my portion is due to curiosity of mine as to the facts possessed by students in regard to matters pathological and their ability to use them, a curiosity so overwhelming as to consume most of the time in the courses assigned me and to leave but little for the imparting of new or additional information. To ascertain the student's equipment with knowledge which has a real dynamic value and represents power rather than learning in the usual sense has always been a fascinating inquiry for me. To illustrate this some recent experiences using museum preparations for teaching purposes will serve. We have used such preparations in a routine way for a number of years in the patho-

[1] An address before the class graduating at the end of the winter quarter, 1910.

logical department. During the first six months of this period I demonstrated these specimens to small groups of students. Then I discovered that what the student saw in the preparation was for the most part seen in a mimicry way and because the particular features were pointed out. Without inquiring, I had no assurance that those important features were seen or understood, notwithstanding my demonstration. Since then the labeled museum specimens have been demonstrated by the students to the instructing force and the student searches independently for the alterations illustrated by the preparation. What he fails to recognize among the important characteristics can be pointed out just as well by this plan as the other and certainly his attitude in the examination of the museum preparations has been changed. We are all prone at times to forget and pay so much attention to teaching that no opportunity remains for the exercise of such indiscrete curiosity referred to as being a handicapping possession. The result of this is that the one teaching has no proper appreciation of what the student is learning or has learned and when occasion demands that in some way the student shall show what he or she has gained, amazement on the part of the instructor and sometimes other feelings result from seeing how little of real value has been conferred.

Other factors which have discouraged enthusiasm over your present speaker's methods of instruction are, the great demand for carefully systematized information suitable for written examinations and my reluctance to furnish such didactic instruction. Although I recognize the necessity you are all under of passing examinations (most of them written examinations) during your undergraduate work, for graduation, for hospital positions and for licensure, necessities which I regret and do not believe should exist as now constituted, I have found it very difficult to become deeply interested in any examination which is not a practical test of efficiency. I am unwilling to accept what a student writes in an examination as an equivalent for what he or she can do when confronted with the conditions discussed in written answers. This view is only a detail of a larger belief and ideal which I am confident we have in common, that a medical school should be a place where medicine is practised by students instead of a place where students prepare to practise; and in subscribing to this as a worthy ideal you in all justice will admit that an absence of enthusiasm on my part over your preparation for written examinations is not entirely inconsistent and you will perceive the reasons for my interest and activity in actual work by the student rather than in didactic instruction.

The statement just made that a medical school should be a place where students practise medicine sounds a little trite, but the discussions of this truth in one way and another in recent years have formed in this country the nucleus for a literature on medical education where little of the sort previously existed. We are all, student body and faculty, keenly alive to the great need of this school for a hospital in which to teach medicine.

You no doubt know of the activity awakened among the state boards of examiners for licensure by the council of medical education of the American Medical Association, the chairmanship of which we are honored by having Professor Bevan occupy. One of the results to which this activity has in some measure contributed is the introduction by the medical board of Minnesota of practical examinations for the license to practise medicine in that

state—practical examinations already carried out in some branches and to be extended to all branches very shortly according to their statements. Furthermore, that board has notified other state boards that full reciprocity relations would be held only with such state boards where similar methods of examination were in vogue. When I heard this announcement made I thought that the millennium was certainly approaching, for I too, like some others among teachers, have fondly and hopefully talked and thought of the correction of perverted view-points and other existing evils which such methods of testing your efficiency would bring about.

To some of my colleagues my reluctance to teach didactically may seem a dereliction of duty, but this remissness apparently is not productive of such lamentable results as at first glance one might suppose would be the case. The facts needed by our students to pass examinations in pathology are obtained in some way and acquired very well to judge by the reports. In one of the western states where it is believed the medical board has always favored graduates from institutions in that state, one of our graduates took the examination for a license to practise not long ago and subsequently told me that one of the medical examiners in complimenting him upon his success referred to the high grade secured in pathology by graduates from this school. Evidence is at hand from other sources that students here do in some way obtain the necessary information in pathology for such ordeals notwithstanding this lack of didactic instruction.

There is another phase of this subject which I am disposed to treat frankly with you. I know you already have strong suspicions of the existence of a difference of opinion among many of your teachers here in regard to the work of the so-called hospital class,[2] the advisability of its continuance and of faculty recognition for it. It does not seem to me imprudent to tell you that the consideration of this matter at faculty meetings has developed sharp differences of opinion. It is altogether complimentary to your faculty that questions of teaching methods and their merits can excite such—to state it mildly—enthusiasm. I am also disposed to discuss this subject because I have occupied places in both camps. One of the reasons of my desertion to the camp of those who are strongly opposed to this method of teaching may seem a strange one to you. It is the well-founded conviction I possess that teaching in medicine which has for its chief and final aim, the diagnosis of the disease, is pernicious because it tends to generate a sense of contentment and triumph over the arrival at a diagnosis, because it appoints as the journey's end what should be but a breathing place, because there goes with this emphasis of investigation to predicate a diagnosis, the implication, at least, that with the diagnosis made, investigation can cease and treatment begin; and I have been convinced that the work of the so-called hospital class—and you will please remember that I labored faithfully in this kind of teaching a number of years—is of such a character as to cultivate in the minds of the students the notion that accurate diagnosis represents the Ultima Thule of their inquiries, the finality of medical education. This conviction is partly the result of watching the careers of students who have industriously followed the hospital class work, practised

[2] A class prepared by written and oral so-called "quizzes" for hospital examinations, particularly for the written examinations conducted under the civil service regulations which govern the securing of places as residents in Cook County Hospital, the large charity hospital of Chicago. The system of preparation is essentially one of "cramming."

diagnosis and treatment in their hospital services, studied diagnosis in many courses in Europe and have never been able, apparently, to obtain any other view-point of medicine by reason of these deadening influences at an impressionable age. In some instances the results have been but little short of a tragedy.

When in the course of events I became converted to this view, although firmly believing in a hospital training and in the large field legitimately occupied by diagnosis in medical education, I could not consistently help students to secure hospital positions by a course of instruction which I believed was by its very nature disposed to bring about their practise of medicine in hospital work as though it was a finished science. The problem thus presented itself to me very clearly. Should I devote my time to instilling in the minds of students the unfinished or the completed condition of medicine? So I became an anarchist in so far as my energies have been concerned in destroying what in other ways was being built up. The disapproval of a considerable number among the student body was immediately my portion when I took this step.

In passing from this to another phase of these matters it is proper to remark that the field of my labors, having to do considerably with the examination of dead bodies, is not one which helps to give the worker in such a field a fair and just estimate of the heights to which diagnosis in medicine has actually attained.

You may be interested and perhaps a little chagrined to know that in your instruction in pathology during the last two years of your medical course, you have played the rôle of apparatus in a pedagogical experiment, an experiment which has been going on now almost nine years. I have already pointed out that our graduates in spite of the absence of any considerable didactic instruction in pathology during the last two years in medicine pass the state board examinations; as you know, the percentage of failures is commendably small. The large number of graduates from this school who secure hospital positions by written examinations do so without participation by members of the pathological department in the instruction of the class preparing for such examinations. These conditions, however, had nothing to do with the initiation of the pedagogical experiment I wish to describe.

The teaching of pathology has, to my knowledge, no fixed or standard method. In each medical school or university methods are in vogue which are largely matters of tradition. There is no widely endorsed plan nor is there any organization among pathologists for the purpose of ascertaining and adopting the most desirable method of teaching this branch of medicine analogous to the associations of other professional teachers, for example the National Society for the Promotion of Engineering Education, in this country. Perhaps the nearest approach to any concerted effort of this sort has to do with the recommendations of the council of medical education previously referred to which deal with the apportionment of the time to be spent in the different studies. It has been left to each instructor to follow his own methods and ideas. In most institutions following the acquirement of the principles of general pathology and bacteriology students are expected to obtain with more or less thoroughness a knowledge of the subjects usually included in the textbook considerations of special pathology or regional morbid anatomy, a systematic review of the lesions of particular tissues or organs.

There were several reasons for abandon-

ing the latter part of this traditional method when the instruction during the first two years was transferred to the university in 1901. One was the lack of time in the crowded schedule of the last two years of medicine; another, that in all the other branches taught in the last two years there is of necessity a great deal of attention paid to the details of these regional lesions. The weightiest reason was the necessity, had traditional customs been followed, of making the instruction largely didactic.

As students you are familiar with Course VI.–12.[3] You know the large part your labors have played in the completion of the records of post-mortem examinations. Since the summer of 1901 when this course was begun, and beginning gradually, the records of over 1,000 post-mortem examinations have been completed in the regular class work. As now conducted students perform all of this work under supervision and during the last year or two some of the student assistants have acquired sufficient proficiency to be entrusted with the post-mortem examinations. The work of the class has been mainly the histological and bacteriological examinations. I have not attempted to estimate how many isolated anatomical examples of disease from operations and sources other than the post-mortem examinations included in our regular series have been examined by students in this course; their number would be a considerable one, certainly several hundred. A great deal of material such as drifts into every pathological laboratory has not been utilized in this manner because of its poor teaching value; it has been insufficient in amount, the clinical facts have been meager and the aim has been to do more than simply diagnose the lesion.

Eight hundred and thirty-three students have taken the course which has now been running 33 quarters[4] not counting the one just completed. The average number of students per quarter has been $25\frac{1}{4}$, the average number of post-mortem examinations attended by each class, as a whole, $16\frac{2}{3}$, altogether 548 during the nine years, about half of the number added to the files of the laboratory during that time. The remaining half of the post-mortem examinations were attended very largely by portions of the class, sometimes a few, sometimes nearly the entire class. All of the important organs are usually brought to the laboratory, those with the important lesions always when possible. There are many other details of the work of this class interesting from the standpoint of teaching, but time requires me to limit myself to the more important results. In connection with the work students have made 450 reports to the class. Some of these reports have been but a few brief remarks in connection with a demonstration of microscopic preparations, gross lesions or the results of bacteriological examinations. On the other hand, a small portion of the reports or the work in connection with them have resulted in published accounts. In the *Transactions of the Chicago Pathological Society* there are between fifty and sixty articles contributed by *undergraduates* of this school; many of these are the result of work begun in this class. Others, as you know, have resulted from special work under the direction of

[3] This course in pathology is taken by students during the last two years of medicine and Rush Medical College is no exception to other medical schools located in large cities; many students with part of their training in the universities of smaller places complete their medical studies where the clinical material is more abundant.

[4] The quarterly system, four periods of ten to eleven weeks each year, is used at Rush Medical College.

other teachers in this department, Drs. Hektoen, Weaver, Wells, Ricketts, Jordan and Harris. Many others have resulted from the completion of some work in the class which broke the ice, so to speak, and taught the students facility in investigation and productivity. For some few these first efforts were the beginning of periods of investigation not yet ended and we all have been proud of both the products and the producers.

Now as to the value of this experiment in medical instruction, I am confident the results are such that its continuance is advisable. Pedagogical problems are as worthy of experiment as any, and in this country especially the investigation of teaching methods has been active, although not so much in medicine perhaps as in other sciences. In an address before the American Federation of Teachers of the Mathematical and Natural Sciences in 1908, Professor Remsen stated that he had been experimenting to find out how to teach chemistry and that it was the most difficult experiment he had ever tried. I have no doubt his experimentation has been going on many more years than the one I am interested in. I can not refrain from comparing the work of Course VI.–12 to that of some of the technology schools which have won commendation by teaching and producing articles of commercial value at the same time. The records of the post-mortem examinations are certainly of some value as a product.

In discussing the results of the teaching as carried out in this course, reference may be made again to some of the ideas expressed earlier. I feel obliged to caution any one who will undertake to apply to his or her teaching the methods we have endeavored to carry out in the class work of Course VI.–12, for I fear they incur great danger of losing whatever of proper regard they may have for didactic instruction. I do not believe it is altogether the more lucrative rewards surgery offers as compared with other varieties of medical practise which is responsible for a complaint often heard about internes, "that all they seem to care about is to see cutting and blood run"; certainly the teaching of surgery to undergraduates offers many problems; their opportunities to participate in the surgical work in hospitals had many novel experiences for them. The Course VI.–12 offers excellent opportunity for the student to become acquainted in a practical way with the incomplete state of medical science and what to my mind is an especial advantage, with the limitations of medical diagnosis; and these things are learned not by the telling but by the doing. On all sides we hear at present of the value of investigation in maintaining a critical attitude; we might well ask, when has experience failed to lead to wisdom in intelligent beings?

In the course under discussion it has seemed to me that the greatest good is represented by the reports made by students (450 to 833 students, a little over one half), for these represent the result of personal, and, as far as possible, independent study.

And here is the crux of the entire matter of my unpopularity; it lies in my effort to make individual inquiry as independent as possible, to help only at the last moment, and since this means to so many students a predicament they are unaccustomed to, my motives no doubt have been misunderstood in many instances, the value of the method questioned or condemned in others. In conclusion, if you are in doubt as to whether this has been an apology or a defense, I beg you to overlook the introduction of the personal element of my unpopularity, a matter in which I never was greatly in-

terested, and remember the advice given you in making your reports to the class, never to read them. I would like now to add to that advice the recommendation that when you do read a report, as I have this, you introduce into it something guaranteed to prevent drowsiness on the part of your audience.

E. R. Le Count

Rush Medical College, affiliated with the University of Chicago

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NOTES RELATIVE TO THE INVENTORS GUILD

In the early part of 1910, several men who had done work along the line of invention, and who, in developing and patenting their inventions, had come to realize the difficulties and disadvantages under which the inventor labors, instituted a movement for the formation of a society looking toward the betterment of these conditions. The result of this movement was the formation and incorporation in New York City of the Inventors Guild, the object of which is briefly outlined in the following quotation from the Constitution of the society:

> The object of the Guild is to advance the application of the useful arts and sciences, to further the interests and secure full acknowledgment and protection for the rights of inventors, to foster social relations among those who have made notable advances in the application of the useful arts and sciences.

Some of the handicaps to which the inventor is subject, other than the proverbial one of never having any money, are the delays in the Patent Office and the ineffectiveness of its work, due to over-crowding and lack of proper facilities; the expense and tardiness of litigation, and the possibility under which a rich corporation may, by delaying and prolonging a suit, increase the expenses to a point which makes such suits prohibitive for a poor inventor; the disadvantage to which the American inventor is subject in foreign patent offices, as compared with the liberality of the American Patent Office toward the foreign inventor; and many other conditions militating against the American inventor which should be remedied.

The membership of the Inventors Guild is limited to fifty. The idea of limiting the membership is that with a small society of this sort it is easier to accomplish real results than with a larger organization, hampered as it must be by unwieldiness and red tape. Further, with a small organization each man will feel that he is a working unit, and that he will be depended upon to do real work, whereas in a large organization the general feeling is that there will be plenty of other men to do the work, and that lack of assistance from any particular member will make little, if any, difference. The result is that in the large organization the work, if any, is usually done by even a smaller number of members than that provided for in the Inventors guild.

It is proposed to select the membership of the guild carefully, and to this end a member must be formally proposed by a member of the guild, must be personally known to five members of the guild, must pass the membership committee and board of governors, and finally must be voted upon by the whole membership, four per cent. of the votes cast being sufficient to reject a candidate. The object of such discrimination is to include amongst the members of the guild men who not only have made inventions, but who have achieved some measure of success therewith, and who will therefore be capable of exerting some influence; and also that no one shall be admitted who will not be congenial to practically the entire membership.

The officers of the Inventors Guild are as follows: *President,* Ralph D. Mershon; *First Vice-president,* Chas. W. Hunt; *Second Vice-president,* Chas. S. Bradley; *Secretary,* Thomas Robins; *Treasurer,* Henry L. Doherty.

The Board of Governors are: Ralph D. Mershon, Leo H. Baekeland, Chas. W. Hunt, Chas. S. Bradley, Michael I. Pupin, Peter Cooper Hewitt.